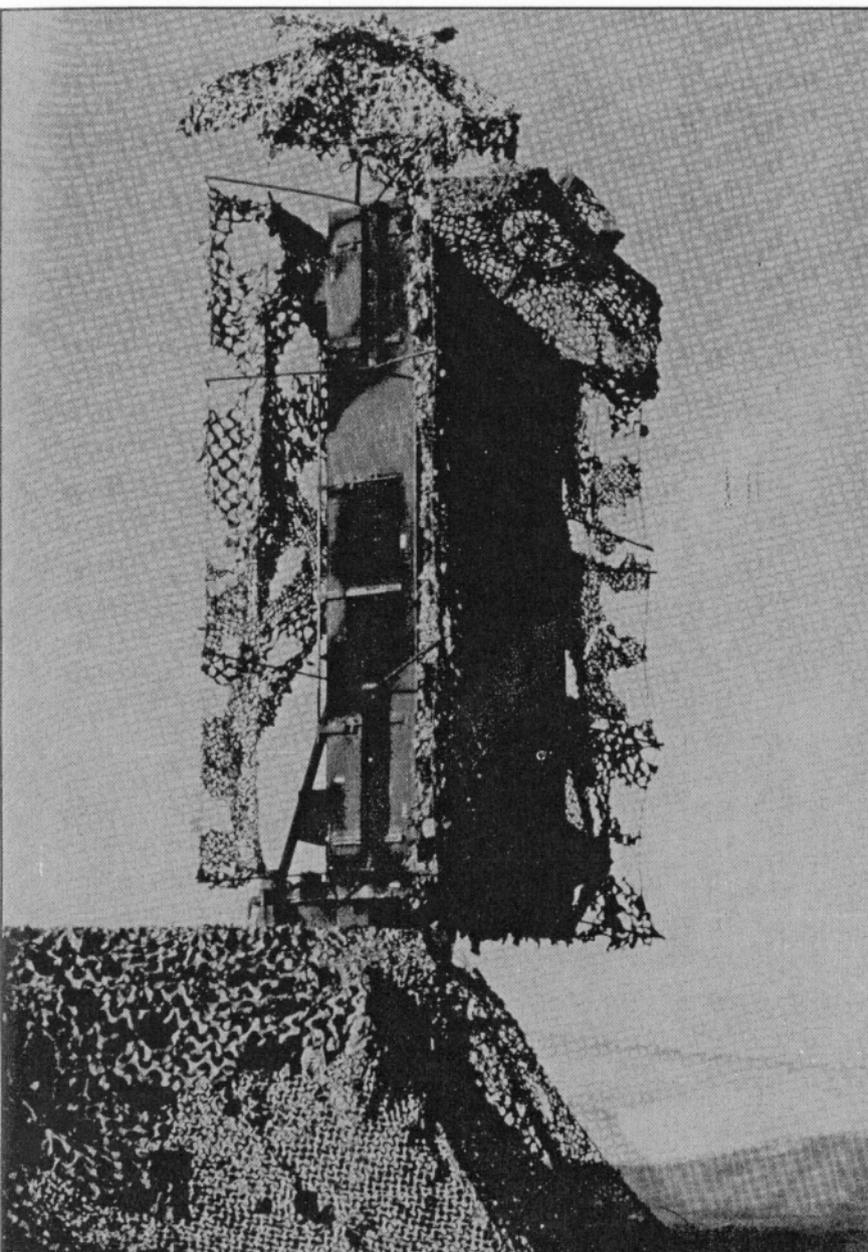


# Targeting During Desert Storm

By Captains Richard A. Lacquement,  
Joseph V. Pacileo, MI, and Paul A. F. Gallo



**D**uring the ground campaign against the Iraqi Army, the overwhelming majority of the missions we fired in the 1st Armored Division Artillery (1st AR Div Arty) were unobserved. The effectiveness of these fires was primarily a function of the targeting process. To engage the Iraqi military, we relied heavily on intelligence to provide targets and on our organic radars (Q-36 and Q-37 Firefinders) to alert us to enemy artillery fires.

To make this targeting process successful, we had to develop, train on and execute a plan that integrated the Div Arty-level intelligence, counterfire and operations elements. With input from other agencies, such as the radars, the division fire support elements (FSE) and the division's military intelligence battalion (MI Battalion), we developed and executed fire plans that kept the Iraqi Army constantly off balance and supported the division's scheme of maneuver.

In this article, we discuss aspects of our combat experience in Operations Desert Storm that may be useful in other operations. First, we discuss the planning, training and rehearsals we used to build the Div Arty intelligence-counterfire-operations team. Second, we describe some key events during the war that show the team's effectiveness. Last, based on our combat experiences, we make some recommendations that might help units in future operations.

It's important to note the doctrinal elements that influenced us. Although we refer to functions of intelligence, counterfire and operations as separate in this article, in fact, all three elements are part of the Div Arty operations section. With the Div Arty tactical fire direction system (TACFIRE) also part of this section, doctrine recognizes their interwoven importance. The one element that isn't included in the Div Arty operations section's table of organization and equipment (TOE) is the counterfire section that's organic to the Div Arty's target acquisition battery.

## Training

The first order of business when we arrived in Saudi Arabia was to train. In our tactical assembly area (TAA), we focused on training individual and section mission essential tasks.

For the operations section, training included emphasis on voice mass-fire mission processing, plotting and tracking unit locations, developing and war-

gaming plans and orders to direct the division's plans and commanding and controlling the 1st Armored Division's Force Artillery. The intelligence section concentrated on understanding the Iraqi Army, particularly the Iraqi artillery; artillery intelligence preparation of the battlefield (IPB); and the enemy's situation and order of battle. The counterfire section emphasized training on fire planning (both manual and digital), employing the Div Arty's radars, interfacing the variable format message entry device (VFMED) and TACFIRE and delivering digital and voice fires on counterfire targets.

All three elements trained on mobile operations and emplacement and displacement drills in conjunction with the new movement formations the Div Arty had developed for the desert. One of the most important aspects of our maneuver training involved shakedown exercises using three recently acquired M577 command post carriers as the Div Arty tactical operations center (TOC).

Next, we pulled the three sections together to build a team. The framework we used to define key responsibilities was a matrix based on the decide, detect and deliver functions (see the figure).

## Counterfire

Given the degree of emphasis on the Iraqi artillery threat and its chemical capability, the counterfire mission was one of the force artillery's primary missions. To be able to adequately employ the shorter range Q-36 radars well forward of the division front, we allocated one Q-36 radar to each of the three direct support (DS) battalions. The mission of the Q-36s, as well as the Q-37s, was general support (GS). The battalions maintained operational control (OPCON) of the Q-36 radars for movement and logistical support. If appropriate, the Div Arty commander could change the Q-36s' mission to direct support of the cannon battalions.

## Intelligence

Our S2 section was responsible for the enemy artillery order of battle for the division and was the enemy artillery expert for the division's intelligence network. To support these responsibilities, we increased the Div Arty S2 section from five personnel (authorized by our modification TOE) to eight just before we deployed from Europe.

Additionally, the Div Arty established a liaison officer (LNO) in the MI battalion technical control and analysis element (TCAE), using one of the captain's slots designated for the S3 section (the survey platoon commander). This LNO gave the Div Arty S2 section direct access to the raw intelligence data generated by the division's organic collection assets (EH-60 Quick Fix helicopters and the MI Trail Blazer direction finding systems) as well as other data funneled through the MI battalion from corps assets.

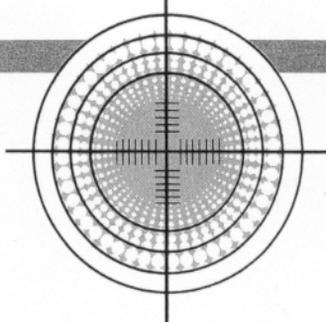
We used this information for artillery targeting without the data's going through the usual filter of the division all source

intelligence center (ASIC). The result was the Div Arty S2 received targeting data much more quickly.

**Terrain.** For the artillery IPB, the biggest difference from analyzing Soviet artillery employment in Europe and Iraqi employment in the Kuwait Theater of Operations (KTO) was the terrain. The desert made every place a reasonable firing point and any direction a viable avenue of approach. Because the US Army would be in the offense and our enemy in the defense, we had to determine the weaknesses of the enemy's defensive posture and ways to exploit them.

	Operations	Intelligence	Counterfire
<b>D E C I D E</b>	Target Types Engagement Means Method of Engagement Use of GS vs DS/R Artillery Positioning Guidance for Radars	Know	Know  Develop Radar Zones  Position/Command & Control Radars
<b>D E T E C T</b>	Sources: Div Arty Command Net (FSO/FSE Input) FSE Targeting Division Command Net (Maneuver Unit Input) Miscellaneous Targeting Data	Sources: TCAE LNO Division G2 Other Intel Sources	Sources: Radars Zones Search Orientation  Other TACFIRE Input
<b>D E L I V E R</b>	Voice on Command Net (Div Arty Mass Mns, Use of DS & R Cannons, MLRS Missions)  Establish Quick-Fire Nets/Channels  Clear Fires for Counterfire (Other than Pre-established Clearance Zones)	None	Deliver MLRS Fires on Radar Acquisitions within Pre-established Zones  Recommend to Operations the Use of other than GS Assets
<b>I N F O W</b>	Pass Key Intelligence Reports on Div Arty Command Net (Voice)	Pass Intel Reports to Subordinate Battalions  [Use TACFIRE (1st Priority) or Voice (2d Priority)]	Send CBTIs and Other Messages to Subordinate Battalions and FSEs

Decide-Detect-Deliver Functions for the Operations-Intelligence-Counterfire Team. The 1st Armored Division Force Artillery pulled the operations, intelligence and counterfire sections together as a team for Desert Storm, defining key responsibilities in terms of the decide, detect and deliver functions.



Given the lack of terrain choke points that would define probable Soviet-style fire sacs, we sought other techniques that might indicate how the Iraqis were focusing their artillery effort. Although templating enemy artillery usually would have been extremely difficult in such featureless terrain, the Iraqis reliance on a fixed network of defenses allowed intelligence systems at the strategic level to easily identify almost all their unit locations. Hence, for templating, we knew where most of their positions were and what types of artillery units were in those positions.

The intensity of the Allied air campaign and the particularly ferocious attention given to the Iraqi artillery (a theater priority) made it very difficult for any of the enemy artillery units to relocate even after the air war began. We accurately judged the Iraqis would stick to their dug-in artillery sites rather than move in the open.

**Range Fans.** Knowing what type of Iraqi artillery was at which locations allowed the S2 to understand the Iraqi artillery's focus through an analysis of the range fans of the various systems. The dug-in positions the Iraqi Army created for its artillery also gave us a good idea of the constraints they'd face trying to fire in any direction other than the one supported by their initial emplacement. Knowing the traverse limits of the towed systems in the Iraqi inventory, we factored them into our analysis. Our end product was a series of range fans for the Iraqi artillery units, which incorporated the range arcs of the systems with the traverse limits indicated by the observed direction of lay for the different positions. When we laid each position's fan on a map, the resulting diagram showed the areas where the Iraqi artillery battalions' fires would overlap. By indicating the number of enemy battalions that could engage a given area, the S2 produced a diagram showing the areas of greatest risk to our forces. The diagram also showed areas where Iraqi artillery coverage was minimal, those areas we could best exploit.

## Operations

The operations section overlaid the diagram on maneuver graphics, allowing us to determine the best way to approach the Iraqis. This limited our exposure to their fires and allowed us to devise

counterartillery fire plans to engage their artillery from the most effective positions.

On the operations side, we used our range fans to determine the limits of advance we would have to reach before we could effectively engage the enemy artillery systems or other targets. In conjunction with this, the radars were given positioning guidance to focus them on identified Iraqi artillery positions.

Using the enemy situation, we rehearsed how we'd attack the Iraqi artillery in several different scenarios. We incorporated this technique into our TOC training on several occasions, to include the fire support command post exercise (CPX).

## Command Post Exercise

Our last major training events were a Div Arty CPX and a Div Arty fire support rehearsal of the war plan and our contingency plans. The CPX incorporated the Div Arty and battalion TOCs, battalion fire direction centers (FDCs) and the brigade and division FSEs. Participants often not included in peacetime training were our air liaison officers (ALOs) at the division and brigade levels (Air Force personnel), who played critical roles in our execution of the fire support plan.

During the CPX, we rehearsed reporting and other procedures for a division movement-to-contact, developing and executing fire plans against deep targets and executing force artillery mass fire missions. A point of emphasis in the CPX was the use of TACFIRE to support planning and execution.

One of the most beneficial parts of the CPX was the after-action review (AAR) conducted the next day. With all the key fire support leaders and the assistant division commander for maneuver present, we solidified the fire support concept we had developed in Germany and Saudi Arabia.

Ultimately, the CPX proved to be the single most valuable training event in the

Div Arty TOC's preparations for the ground war. Although the actual situation in the ground war differed from our initial plans, the concepts remained the same, so our actions during the war were directly related to our training.

On 23 February 1991, we assembled the same participants we had for the CPX and conducted a detailed briefing and back-brief rehearsal of the fire support plan for the actual attack. In many respects, the CPX of a couple weeks earlier laid the foundation for all fire supporters to clearly understand the maneuver concept of the operation and the Div Arty commander's fire support concept.

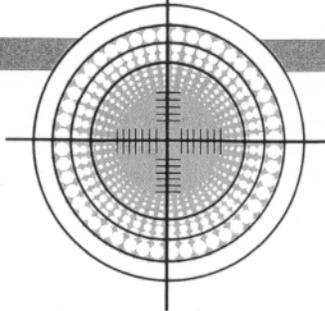
## The Attack

On 24 February 1991, the 1st Armored Division crossed the Saudi-Iraqi border as part of the VII Corps flanking movement against the Iraqi Army. The division moved in a wedge formation on a movement-to-contact with every element moving at the same time. As planned, we didn't maintain continuous firing capability. As expected, we didn't encounter any resistance the first day or evening as we moved approximately 50 kilometers inside Iraq.

The major difference during the war from our training in the TAA was our reliance on the mobile (tracked) Div Arty TOC. Because of the speed of the division's movement, the two vans that normally served as the operations-intelligence-counterfire work space were never put into action during the ground war. The only significant effect was that the counterfire section did not have its VFMED, but we easily made up for it by conducting the section's digital operations from the Div Arty TACFIRE shelter.

**PL Colorado.** On the move, the three elements of the TOC maintained communications with each other over the Div Arty command net. Each track had a Motorola hand-held radio to carry on more lengthy coordination while on the move. During short halts, the S2 section ran spot-report summaries and other intelligence data over to the operations track. Also during the halts, the three sections coordinated face-to-face.

On the second day of the ground war, the division continued the movement-to-contact toward our 3d Brigade's first objective in the vicinity of Phase Line (PL)



Colorado. About 30 kilometers from the objective, the division G2 reported two BM-21s (Soviet-made truck-mounted multiple rocket launchers) south of the objective. We stopped the force artillery (at that time, only the multiple launch rocket system, or MLRS, battalion and Q-37 radars) and fired 12 rockets at the site.

Although this later proved to be an effective counterartillery mission, the lag created between the lead maneuver elements and the force artillery because of our stop caused the 3d Brigade to close on its objective before the force artillery was in position to fire two plans scheduled for the vicinity of PL Colorado. To maintain the momentum of the attack, 3d Brigade fired the plans using only their DS artillery battalion.

As the division completed the fight near PL Colorado and began moving toward Al Busayyah, we received updated intelligence reports and spot reports from helicopter reconnaissance missions giving more information on the enemy dispositions near Al Busayyah. The three sections worked on the fire plans for the objective while moving, modifying the plan and creating a new one to support a planned attack helicopter raid. Using the TACFIRE system, which we also operated on the move, we transmitted the updated fire plans to the MLRS battalion and then later to the two DS battalions that would support the plans.

**Al Busayyah.** We got clearance to fire on the targets from the fire support officers (FSOs) of the two brigades with sectors in the Al Busayyah area as soon as we reached the position from which we'd execute. From the Div Arty TOC, we directed a suppression of enemy air defense (SEAD) and a brief preparation fired by both the MLRS and DS cannon units.

The cannon units struck several key targets during the night, using harassment and interdiction fires. We continued to receive updated targeting data from the division G2 and our 4th (Aviation) Brigade. We used this information to refine the target list for the following morning's preparation on the maneuver objectives near Al Busayyah. Using TACFIRE, we quickly modified the target lists, transmitted them to the units participating in the prep and sent the lists to the brigade and division FSEs to clear the plan's targets.

After the fight at Al Busayyah, we had expected a tactical pause of 24 to 36 hours when we would have worked out the fire plans with the division FSE for the attack against the Republican Guards. But our division continued to move and attacked into the Republican Guards Madinah Division as soon as it could. With the division main FSE trailing far to the rear, we couldn't get its input for the targeting process. But our links with the division intelligence system allowed us to develop the same targeting data the FSE would have had to work with.

On the move, we once again created and disseminated the fire plans we would need for the artillery attacks against the division's main objectives. We continued to update and improve the plans as we received more information on our objectives.

**Republican Guards Division.** During the move toward the Madinah Division, we received information on locations of units in the Tawakalna and Adnan Republican Guards Divisions. Both had moved elements into the path of the 1st Armored Division, presumably to block our movement while other Iraqi units slipped out of the theater. We targeted these units quickly, primarily with MLRS, and then the maneuver units fought through them with their DS artillery to maintain the momentum of the division's movement toward the Madinah Division.

As we moved within the range of the first elements of the Madinah Division, the division commander directed we fire on three theater logistics sites behind it. Because we were moving forward when we received the directive and there were only three targets (albeit very large ones), we sent the fire plan instructions by voice over the Div Arty command net to the MLRS battalion and the 75th FA Brigade, which had just joined our formation "on the fly." We stopped at our next firing location, and our MLRS battalion and the 8-inch battalion from the 75th FA Brigade fired on the three sites.

These fire missions occurred while the maneuver elements were still fighting through the Adnan units to our front. As soon as the maneuver brigades pushed through the Adnan Division, we began moving again, this time, with the 75th FA Brigade arrayed around our MLRS battalion, radars and TOC. As we moved near the main body of the Madinah Division, we had two more cannon battalions and an additional MLRS/Army tactical missile system (Army TACMS) battery to add to the artillery fight.

We had already hit part of the Madinah Division and were within the extended range fans of the Madinah's artillery, so we dropped off one of our Q-37 radars to look for any enemy artillery fire and continued east with our division.

The original plan had been to stop the division outside of the Madinah's extended artillery range fans and conduct MLRS counterartillery raids to eliminate its artillery. But our division commander decided to accept the risk of enemy artillery fire and maintain the momentum of our attack. To guard against enemy artillery fires, we began to leapfrog the two Q-37 radars every 10 kilometers to maintain continuous counterfire surveillance of the Madinah's artillery.



CPT Hartigan, 75th FA Bde

A 75th FA Bde TACFIRE Shelter. The brigade joined the 1st Armored Division Artillery just before engaging the Republican Guards.



CPT Harrigan, 75th FA Bde

MLRS launchers fire on Iraqi positions during Desert Storm.

At about 0930 on 27 February, as our lead maneuver elements began closing on the enemy division, we received the first reports of incoming artillery fire in the division sector. At first, we didn't have any radar acquisitions. But 2d Brigade knew enemy forces were northeast of the division sector and directed its Q-36 radar to orient to the northeast. As the radar began picking up acquisitions, we stopped our other Q-37 radar and oriented it to the northeast. Soon we had multiple acquisitions coming from the same location in the XVIII Airborne Corps sector.

We immediately sent the mission to our MLRS units with "Do Not Lay" status and called the division to get clearance to fire. The division passed the request to the XVIII Airborne Corps, and 39 minutes later, we received clearance to fire. As soon as we fired, the enemy fire from that sector ceased. Fortunately, the enemy artillery was erratic and completely ineffective, causing no casualties in the division while we waited for clearance to fire.

Because the acquisitions came while we were moving, we sent the fire mission grids by voice over the command net before we had digital communications set up. Additionally, we ran the Q-37 acquisitions from the radar shelter to the counterfire M577 50 meters away. We used the tape readouts from the radar to plot the enemy fire unit centers of mass and decide on the fire mission grids.

After firing on these counterfire targets, we prepared the MLRS to execute a counterartillery fire plan against the Madinah Division's artillery. The division's Apache helicopters also were involved in attacks on the Madinah at this time, so we coordinated the fire plan with the cycling in and out of the Apache companies. The MLRS was well-suited to the task; we fired on all the targets in the plan

in less than two minutes and reopened the airspace for continued Apache attacks.

Soon afterward, the division moved again, and the Q-37 we had left behind began acquiring targets from the Madinah Division. We immediately stopped the force artillery and went into an aggressive counterfire fight to silence the Madinah's artillery.

As with the first counterfire targets, we received the acquisitions by voice from the Q-37 and quickly passed the missions down to the MLRS units. When the second Q-37 was set up and radiating, we again ran the acquisition tapes from the Q-37 to the counterfire and operations tracks. Here we plotted the acquisitions, determined the most threatening targets, cleared the targets through the division and brigade FSEs and passed the missions to the MLRS units. We quickly silenced the enemy units; later we determined we had fought six Iraqi artillery battalions.

In some instances, restrictive fire support coordination measures to support the Apache operations prevented us from firing on certain targets with MLRS. In these situations, we passed the targets to the Apaches over the division command net so they could attack the artillery firing at the division. Twice we received confirmation that our handoffs led to the Apaches' destroying Iraqi artillery positions.

The Iraqi artillery fires—even those landing amongst division units—led to no serious injuries. It was clear the Iraqi targeting system was extremely ineffective.

Our last major artillery event of the war came as the division prepared for its final assault on the Madinah Republican Guards Division. After dark on 27 February, the division stopped to reorganize, refuel and prepare for the final push to start the following morning

at first light. The division already had fought through almost half the Madinah Division and had its frontline maneuver units within five kilometers of the Iraq-Kuwait border.

The maneuver units stopped operations for the night, but the artillery went into high gear. Using targets from fire plans already developed as well as new targets developed from intelligence sources throughout the day, our own counterfire fight and the feedback from the Apaches, we drew up a brief MLRS prep. The prep was to be fired at 2230 hours and harassment and interdiction fires were to be fired throughout the night. We knew the Iraqi Army was trying to withdraw to the northeast, so some of our main targets focused on interdicting the few north-south roads we were aware of in the area.

The *coup de grace* was a prep we fired with all elements of the force artillery from 0530 to 0615 the next morning. Right on the heels of this prep came a final Apache attack that immediately preceded the maneuver elements crossing the line of departure.

By 0800 that morning, we complied with the theater cease-fire and stopped where we were. The division's lead elements were just inside Kuwait.

## Observations

From the operations, counterfire and intelligence standpoint, we made several key observations during the war with Iraq.

**Training.** A unit fights as it trains, and for us, preparations in Germany and after we arrived in the desert significantly impacted on our success. Everything we did during the ground war—especially those tasks for which our training in Europe didn't prepare us—was performed in accordance with plans and techniques we established before the war and rehearsed with all parts of the team. In particular, the Div Arty-level CPX in early February was tremendously valuable in preparing us for the ground attack.

**Mobile Operations.** As we first analyzed the likely speed of maneuver operations in the offense, it was clear that our doctrinal TOC configuration was inadequate to support our plans (i.e., the expandable van TOC). Although FA battalion TOCs have M577 command post tracks that allow them to operate on the

move, the Div Arty TOC does not. We were able to get three M577s from an inactivating unit before we left Europe, allowing us to fix this problem for the war. Based on our success relying on the M577s, the Div Arty TOC TOE must allot vehicles that support similar operations in the future.

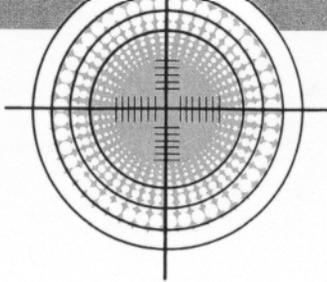
**TACFIRE.** Another observation is one we've heard often at the National Training Center (NTC), Fort Irwin, California. TACFIRE is an outstanding planning tool. But, because of communications problems during mobile operations, it was much easier and more reliable to execute plans and missions using voice radio communications instead of digital TACFIRE communications.

In the long run, the answer isn't to give up on digital means for execution. But, as it currently stands, TACFIRE doesn't easily support this. The age, bulk, and complexity of TACFIRE are all liabilities we have to work very hard to overcome. As soon as possible, we need a more technologically up-to-date, reliable compact and easy to operate system. Under current plans, this equates to the advanced FA tactical data system (AFATDS).

With respect to TACFIRE fire planning, we also found it much easier to input the target list into the TACFIRE computer, send the list digitally to the appropriate subscribers and then send fire planning instructions to the firing units by voice. Our battalion TOCs preferred this method as it made it easier to generate and disseminate the instructions for their firing batteries in accordance with their current situation.

**Intelligence.** According to our doctrine, targeting data generated by the military intelligence system gets to the artillery through the FA intelligence officer in the division FSE who gets his information from the division ASIC. Because of the raw information filtering system at the MI battalion and ASIC, this data often arrives too late to be of any targeting value. This is particularly true with respect to fleeting or relatively mobile enemy targets. Creating an artillery liaison section in the MI battalion TCAE (as we did in our division) would significantly improve the ability of the MI system to provide timely targeting data.

**Counterfire.** Our most important observation goes back to the old debate



about which headquarters should control the counterfire fight. In general, when a Div Arty receives a reinforcing FA brigade, the norm has been for the brigade to control the counterfire fight. From our perspective, this seems almost ludicrous.

Before the war, we didn't have a reinforcing brigade to support us. During the war, we eventually received the 75th FA Brigade after it had participated in the prep fights against the 1st Infantry Division's breach site. The intent was for them to join the 1st Armored Division Force Artillery before our assault on the Madinah Division. Although they joined the division just in time for the main attack, the idea that we could effectively transfer control of the counterfire battle to them on the fly was unworkable.

There are several reasons for this. The Div Arty headquarters is the force FA headquarters for the division and, as such, has a much better grasp of the maneuver commander's intent and how to support it. The target acquisition battery belongs to the Div Arty and generally trains with the Div Arty. Additionally, the processing cell of the target acquisition battery works and trains with the Div Arty TOC regularly and is an integral part of the Div Arty's command and control team.

The intelligence assets the division has access to far exceed those available to the FA brigade. Additionally, the division intelligence system is designed to feed artillery targeting information to the Div Arty TOC through the FSE, the division G2 or, in our case, the FA LNO with the MI battalion. Because the most important part of the battle against enemy artillery is the proactive counterfire or counterartillery battle, the intelligence system is critical to the process.

Finally, the fire support coordination system to clear fires both in the division sector and outside focuses on the division's organic fire support coordination network—from the company FSOs up through the division FSE.

The assets available, the relationships

of the members of the process and the reliability of the relationship between the Div Arty TOC and its division headquarters all point toward the Div Arty TOC as being the best focus for the counterfire battle.

We shouldn't rely on FA brigades with fleeting associations and different standing operating procedures (SOPs) to join a division on the fly, or even with short preparation time, and suddenly step in and control one of the force artillery's most critical missions.

As a caveat, under a system of habitual association and long-term training relationships (as we had in Germany), we can rely on the FA brigade to run the counterfire battle (usually by giving the brigade control of the Div Arty's target acquisition battery and the target acquisition processing cell).

## Conclusion

Without question, training as you'll fight and rehearsing your plan is critical to success in battle. Though the plan may not stay intact after the first encounter with the enemy, the procedures, integrated elements and coordinating relationships you develop greatly enhance your ability to most effectively target him.

We learned a great deal in Desert Storm. Much of what we learned may not apply in different terrain against a different enemy. But we've outlined some experiences and observations we perceive as basic to our ability to target the enemy and kill him in any conflict.



**Captain Richard A. Lacquement** was the Operations Duty Officer of the 1st Armored Division Artillery during Operations Desert Shield and Storm. He's currently the S4 of the 3d Battalion, 1st Field Artillery, 3d Infantry Division (Mechanized) Artillery in Germany.

**Captain Joseph V. Pacileo**, Military Intelligence, served as the 1st Armored Division Artillery S2 during Desert Shield and Storm. He's currently an Operations Officer in the 204th Military Intelligence Battalion, 701st Military Intelligence Brigade, Germany.

**Captain Paul A. F. Gallo** was a 1st Armored Division Artillery Counterfire Officer during Desert Shield and Storm. He's currently a Fire Support Officer in the 3d Battalion, 1st Field Artillery, 3d Infantry Division Artillery.